

## SEQUENCE LISTING

<110> Genesto A/S

Sørensen, Anders Per

Benfield, Thomas Lars

Lundgren, Jens Dilling

<120> Binding member towards Pneumococcus surface adhesin A protein (PsaA)

<130> P752PC00

<160> 56

<170> PatentIn version 3.1

<210> 1

<211> 33

<212> DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (1) .. (33)

<223> Sequence from human antibody generated in mouse.

<400> 1

cgg gcg agt cag ggt att agc agc tgg tta gcc  
Arg Ala Ser Gln Gly Ile Ser Ser Trp Leu Ala  
1 5 10

33

<210> 2

- 2 -

&lt;211&gt; 11

&lt;212&gt; PRT

&lt;213&gt; Homo sapiens

&lt;400&gt; 2

Arg Ala Ser Gln Gly Ile Ser Ser Trp Leu Ala  
1 5 10

&lt;210&gt; 3

&lt;211&gt; 21

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1)..(21)

&lt;223&gt; Sequence from human antibody generated in mouse.

&lt;400&gt; 3

gtt gca tcc agt ttg caa agt  
Val Ala Ser Ser Leu Gln Ser  
1 5

21

&lt;210&gt; 4

&lt;211&gt; 7

&lt;212&gt; PRT

&lt;213&gt; Homo sapiens

&lt;400&gt; 4

Val Ala Ser Ser Leu Gln Ser  
1 5

&lt;210&gt; 5

<211> 27

<212> .DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (1)..(27)

<223> Sequence from human antibody generated in mouse.

<400> 5

caa cag tat aat agc tat cct ccg acg  
Gln Gln Tyr Asn Ser Tyr Pro Pro Thr  
1 5

27

<210> 6

<211> 9

<212> PRT

<213> Homo sapiens

<400> 6

Gln Gln Tyr Asn Ser Tyr Pro Pro Thr  
1 5

<210> 7

<211> 321

<212> DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (1)..(321)

<223> Sequence from human antibody generated in mouse.  
V-segment: 4-34 and J-segment:JK1

&lt;220&gt;

&lt;221&gt; CDR1

&lt;222&gt; (70) .. (120)

&lt;223&gt;

&lt;220&gt;

&lt;221&gt; CDR2

&lt;222&gt; (148) .. (168)

&lt;223&gt;

&lt;220&gt;

&lt;221&gt; CDR3

&lt;222&gt; (265) .. (291)

&lt;223&gt;

&lt;400&gt; 7

gac atc cag atg acc cag tct cca tcc tca ctg tct gca tct gta gga	48
Asp Ile Gln Met Thr Gln Ser Pro Ser Ser Leu Ser Ala Ser Val Gly	
1 5 10 15	
gac aga gtc acc atc act tgt cgg gcg agt cag ggt att agc agc tgg	96
Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Gln Gly Ile Ser Ser Trp	
20 25 30	
tta gcc tgg tat cag cag aaa cca gag aaa gcc cct gag tcc ctg atc	144
Leu Ala Trp Tyr Gln Gln Lys Pro Glu Lys Ala Pro Glu Ser Leu Ile	
35 40 45	
tat gtt gca tcc agt ttg caa agt ggg gtc cca tca agg ttc agc ggc	192
Tyr Val Ala Ser Ser Leu Gln Ser Gly Val Pro Ser Arg Phe Ser Gly	
50 55 60	
agt gga tct ggg aca gat ttc act ctc acc atc agc agc ctg cag cct	240
Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro	
65 70 75 80	
gaa gat ttt gca act tat tac tgc caa cag tat aat agc tat cct ccg	288
Glu Asp Phe Ala Thr Tyr Tyr Cys Gln Gln Tyr Asn Ser Tyr Pro Pro	
85 90 95	
acg ttc ggc caa ggg acc aag gtg gaa atc aaa	321
Thr Phe Gly Gln Gly Thr Lys Val Glu Ile Lys	

100

105

&lt;210&gt; 8

&lt;211&gt; 107

&lt;212&gt; PRT

&lt;213&gt; Homo sapiens

&lt;400&gt; 8

Asp	Ile	Gln	Met	Thr	Gln	Ser	Pro	Ser	Ser	Leu	Ser	Ala	Ser	Val	Gly
1				5				10					15		

Asp	Arg	Val	Thr	Ile	Thr	Cys	Arg	Ala	Ser	Gln	Gly	Ile	Ser	Ser	Trp
		20					25						30		

Leu	Ala	Trp	Tyr	Gln	Gln	Lys	Pro	Glu	Lys	Ala	Pro	Glu	Ser	Leu	Ile
	35					40						45			

Tyr	Val	Ala	Ser	Ser	Leu	Gln	Ser	Gly	Val	Pro	Ser	Arg	Phe	Ser	Gly
	50					55					60				

Ser	Gly	Ser	Gly	Thr	Asp	Phe	Thr	Leu	Thr	Ile	Ser	Ser	Leu	Gln	Pro
65					70					75				80	

Glu	Asp	Phe	Ala	Thr	Tyr	Tyr	Cys	Gln	Gln	Tyr	Asn	Ser	Tyr	Pro	Pro
				85					90					95	

Thr	Phe	Gly	Gln	Gly	Thr	Lys	Val	Glu	Ile	Lys
			100						105	

&lt;210&gt; 9

&lt;211&gt; 15

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1)..(15)

<223> Sequence from human antibody generated in mouse.

<400> 9

ggt ttc tcc tgg agc

Gly Phe Ser Trp Ser

1 5

15

<210> 10

<211> 5

<212> PRT

<213> Homo sapiens

<400> 10

Gly Phe Ser Trp Ser

1 5

<210> 11

<211> 51

<212> DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (1)..(51)

<223> Sequence from human antibody generated in mouse.

<400> 11

gaa atc gat tat aga gga agc acc aac tac aac ccg tcc ctc aag agt

Glu Ile Asp Tyr Arg Gly Ser Thr Asn Tyr Asn Pro Ser Leu Lys Ser

1 5 10 15

48

cga

Arg

51

<210> 12

<211> 17

<212> PRT

<213> Homo sapiens

<400> 12

Glu Ile Asp Tyr Arg Gly Ser Thr Asn Tyr Asn Pro Ser Leu Lys Ser  
1 5 10 15

Arg

<210> 13

<211> 21

<212> DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (1)..(21)

<223> Sequence from human antibody generated in mouse.

<400> 13

ggg ggg ccc cgc ttt gac tac  
Gly Gly Pro Arg Phe Asp Tyr  
1 5

21

<210> 14

<211> 7

<212> PRT

<213> Homo sapiens

<400> 14

Gly Gly Pro Arg Phe Asp Tyr  
1 5

<210> 15

<211> 345

<212> DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (1) .. (345)

<223> Sequence from human antibody generated in mouse.  
V-segment:4-34, D-segment:unknown, J-segment: JH4b

<220>

<221> CDR1

<222> (91) .. (102)

<223>

<220>

<221> CDR2

<222> (148) .. (199)

<223>

<220>

<221> CDR3

<222> (191) .. (312)

<223>

<400> 15

cag	gtg	cga	cta	cag	cag	tgg	ggc	gca	gga	ctg	ttg	aag	cct	tcg	gag	48
Gln	Val	Arg	Leu	Gln	Gln	Trp	Gly	Ala	Gly	Leu	Leu	Lys	Pro	Ser	Glu	
1				5				10						15		

acc	ctg	tcc	ctc	acc	tgc	gct	gtc	ttt	ggg	ggg	tcc	ttc	agt	ggg	ttc	96
Thr	Leu	Ser	Leu	Thr	Cys	Ala	Val	Phe	Gly	Gly	Ser	Phe	Ser	Gly	Phe	



20	25	30	
tcc tgg agc tgg atc cgc cag acc cca ggg aag ggg ctg gag tgg atc			144
Ser Trp Ser Trp Ile Arg Gln Thr Pro Gly Lys Gly Leu Glu Trp Ile			
35	40	45	
ggg gaa atc gat tat aga gga agc acc aac tac aac ccg tcc ctc aag			192
Gly Glu Ile Asp Tyr Arg Gly Ser Thr Asn Tyr Asn Pro Ser Leu Lys			
50	55	60	
agt cga gtc acc ata tta aga gac acg tcc agg agc cag ttc tcc ctg			240
Ser Arg Val Thr Ile Leu Arg Asp Thr Ser Arg Ser Gln Phe Ser Leu			
65	70	75	80
aag ttg agc tcc gtg acc gcc gcg gac tcg gct gtg ttt tat tgt gcg			288
Lys Leu Ser Ser Val Thr Ala Ala Asp Ser Ala Val Phe Tyr Cys Ala			
85	90	95	
aga ggg ggg ccc cgc ttt gac tac tgg ggc cag gga acc ctg gtc acc			336
Arg Gly Gly Pro Arg Phe Asp Tyr Trp Gly Gln Gly Thr Leu Val Thr			
100	105	110	
gtc tcc tca			345
Val Ser Ser			
115			
<210> 16			
<211> 115			
<212> PRT			
<213> Homo sapiens			
<400> 16			
Gln Val Arg Leu Gln Gln Trp Gly Ala Gly Leu Leu Lys Pro Ser Glu			
1	5	10	15
Thr Leu Ser Leu Thr Cys Ala Val Phe Gly Gly Ser Phe Ser Gly Phe			
20	25	30	
Ser Trp Ser Trp Ile Arg Gln Thr Pro Gly Lys Gly Leu Glu Trp Ile			
35	40	45	
Gly Glu Ile Asp Tyr Arg Gly Ser Thr Asn Tyr Asn Pro Ser Leu Lys			
50	55	60	
Ser Arg Val Thr Ile Leu Arg Asp Thr Ser Arg Ser Gln Phe Ser Leu			
65	70	75	80

- 10 -

Lys Leu Ser Ser Val Thr Ala Ala Asp Ser Ala Val Phe Tyr Cys Ala  
                   85                  90                  95

Arg Gly Gly Pro Arg Phe Asp Tyr Trp Gly Gln Gly Thr Leu Val Thr  
           100                  105                  110

Val Ser Ser  
           115

<210> 17

<211> 33

<212> DNA

<213> synthetic

<220>

<221> CDS

<222> (1)..(33)

<223>

<220>

<221> misc\_feature

<222> (33)..(33)

<223> unknown nucleotide

<400> 17

agg gcc agt cag agt gtt agc agc tac tta gcn  
 Arg Ala Ser Gln Ser Val Ser Ser Tyr Leu Ala  
 1                  5                  10

33

<210> 18

<211> 11

<212> PRT

<213> synthetic

<220>

<221> misc\_feature

<222> (33)..(33)

<223> unknown nucleotide

<400> 18

Arg Ala Ser Gln Ser Val Ser Ser Tyr Leu Ala  
1 5 10

<210> 19

<211> 21

<212> DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (1)..(21)

<223> Sequence from human antibody generated in mouse.

<400> 19

gat gca tcc aac agg gcc act  
Asp Ala Ser Asn Arg Ala Thr  
1 5

21

<210> 20

<211> 7

<212> PRT

<213> Homo sapiens

<400> 20

Asp Ala Ser Asn Arg Ala Thr  
1 5

<210> 21

<211> 27

<212> DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (1)..(27)

<223> Sequence from human antibody generated in mouse.

<400> 21

cag cag cgt agc aac tgg cct ctc act  
Gln Gln Arg Ser Asn Trp Pro Leu Thr  
1 5

27

<210> 22

<211> 9

<212> PRT

<213> Homo sapiens

<400> 22

Gln Gln Arg Ser Asn Trp Pro Leu Thr  
1 5

<210> 23

<211> 321

<212> DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (1)..(318)

<223> Sequence from human antibody generated in mouse.  
V-segment: L6 and J-segment: JK4

&lt;220&gt;

&lt;221&gt; CDR1

&lt;222&gt; (70)..(102)

&lt;223&gt;

&lt;220&gt;

&lt;221&gt; CDR2

&lt;222&gt; (148)..(168)

&lt;223&gt;

&lt;220&gt;

&lt;221&gt; CDR3

&lt;222&gt; (265)..(291)

&lt;223&gt;

&lt;220&gt;

&lt;221&gt; misc\_feature

&lt;222&gt; (102)..(102)

&lt;223&gt; unknown nucleotide

&lt;400&gt; 23

gaa att gtg ttg aca cag tct cca gcc acc ctg tct ttg tct cca ggg	48
Glu Ile Val Leu Thr Gln Ser Pro Ala Thr Leu Ser Leu Ser Pro Gly	
1 5 10 15	
gaa aga gcc acc ctc tcc tgc agg gcc agt cag agt gtt agc agc tac	96
Glu Arg Ala Thr Leu Ser Cys Arg Ala Ser Gln Ser Val Ser Ser Tyr	
20 25 30	
tta gcn tgg tac caa cag aaa cct ggc cag gct ccc agg ctc ctc atc	144
Leu Ala Trp Tyr Gln Gln Lys Pro Gly Gln Ala Pro Arg Leu Leu Ile	
35 40 45	
tat gat gca tcc aac agg gcc act ggc atc cca gcc agg ttc agt ggc	192
Tyr Asp Ala Ser Asn Arg Ala Thr Gly Ile Pro Ala Arg Phe Ser Gly	
50 55 60	

- 14 -

agt ggg tct ggg aca gac ttc act ctc acc atc agc agc cta gag cct 240  
 Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser Leu Glu Pro  
 65 70 75 80

gaa gat ttt gca gtt tat tac tgt cag cag cgt agc aac tgg cct ctc 288  
 Glu Asp Phe Ala Val Tyr Tyr Cys Gln Gln Arg Ser Asn Trp Pro Leu  
 85 90 95

act ttc ggc gga ggg acc aag gtg gag atc aaa 321  
 Thr Phe Gly Gly Thr Lys Val Glu Ile  
 100 105

<210> 24

<211> 106

<212> PRT

<213> Homo sapiens

<220>

<221> misc\_feature

<222> (102)..(102)

<223> unknown nucleotide

<400> 24

Glu Ile Val Leu Thr Gln Ser Pro Ala Thr Leu Ser Leu Ser Pro Gly  
 1 5 10 15

Glu Arg Ala Thr Leu Ser Cys Arg Ala Ser Gln Ser Val Ser Ser Tyr  
 20 25 30

Leu Ala Trp Tyr Gln Gln Lys Pro Gly Gln Ala Pro Arg Leu Leu Ile  
 35 40 45

Tyr Asp Ala Ser Asn Arg Ala Thr Gly Ile Pro Ala Arg Phe Ser Gly  
 50 55 60

Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser Leu Glu Pro  
 65 70 75 80

Glu Asp Phe Ala Val Tyr Tyr Cys Gln Gln Arg Ser Asn Trp Pro Leu  
 85 90 95

Thr Phe Gly Gly Gly Thr Lys Val Glu Ile  
 100 105

<210> 25

<211> 15

<212> DNA

<213> synthetic

<220>

<221> CDS

<222> (1)..(15)

<223>

<400> 25

atc ttt ggg atg agc  
Ile Phe Gly Met Ser  
1 5

15

<210> 26

<211> 5

<212> PRT

<213> synthetic

<400> 26

Ile Phe Gly Met Ser  
1 5

<210> 27

<211> 51

<212> DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (1)..(51)

<223> Sequence from human antibody generated in mouse.

<400> 27

aac	ata	aag	caa	gat	gga	agt	gag	aaa	tac	tat	gtg	gac	tct	gtg	aag	48
Asn	Ile	Lys	Gln	Asp	Gly	Ser	Glu	Lys	Tyr	Tyr	Val	Asp	Ser	Val	Lys	
1			5					10					15			

ggc																51
Gly																

<210> 28

<211> 17

<212> PRT

<213> Homo sapiens

<400> 28

Asn	Ile	Lys	Gln	Asp	Gly	Ser	Glu	Lys	Tyr	Tyr	Val	Asp	Ser	Val	Lys
1			5					10					15		

Gly

<210> 29

<211> 57

<212> DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (1)..(57)

<223> Sequence from human antibody generated in mouse.

<400> 29

gat	cgg	ttt	tac	tat	ggt	tcg	ggg	agt	tat	tat	tac	tac	tac	aac	ggt	48
Asp	Arg	Phe	Tyr	Tyr	Gly	Ser	Gly	Ser	Tyr	Tyr	Tyr	Tyr	Tyr	Asn	Gly	



1	5	10	15	
atg gac gtc				
Met Asp Val				57

<210> 30

<211> 19

<212> PRT

<213> Homo sapiens

<400> 30

Asp Arg Phe Tyr Tyr Gly Ser Gly Ser Tyr Tyr Tyr Tyr Tyr Asn Gly  
1 5 10 15

Met Asp Val

<210> 31

<211> 384

<212> DNA

<213> Homo sapiens

 $\langle 220 \rangle$ 

<221> CDS

<222> (1) .. (384)

<223> Sequence from human antibody generated in mouse.  
V-segment:3-7, d-segment: 3-10 and J-segment JH6b

**<220>**

<221> CDR1

$\langle 222 \rangle$  (91) .. (102)

**<223>**

&lt;220&gt;

&lt;221&gt; CDR2

&lt;222&gt; (148) .. (198)

&lt;223&gt;

&lt;220&gt;

&lt;221&gt; CDR3

&lt;222&gt; (295) .. (351)

&lt;223&gt;

&lt;400&gt; 31

gag	gtg	caa	cta	gtg	gag	tct	ggg	gga	ggc	ttg	gtc	cag	cct	ggg	ggg	48
Glu	Val	Gln	Leu	Val	Glu	Ser	Gly	Gly	Gly	Leu	Val	Gln	Pro	Gly	Gly	
1			5						10					15		
tcc	ctg	aga	ctc	tcc	tgt	gca	gcc	tct	gga	ttc	acc	ttt	aat	atc	ttt	96
Ser	Leu	Arg	Leu	Ser	Cys	Ala	Ala	Ser	Gly	Phe	Thr	Phe	Asn	Ile	Phe	
			20					25					30			
ggg	atg	agc	tgg	gtc	cgc	cag	gct	cca	ggg	aaa	ggg	ctg	gag	tgg	gtg	144
Gly	Met	Ser	Trp	Val	Arg	Gln	Ala	Pro	Gly	Lys	Gly	Leu	Glu	Trp	Val	
		35					40					45				
gcc	aac	ata	aag	caa	gat	gga	agt	gag	aaa	tac	tat	gtg	gac	tct	gtg	192
Ala	Asn	Ile	Lys	Gln	Asp	Gly	Ser	Glu	Lys	Tyr	Tyr	Val	Asp	Ser	Val	
	50					55					60					
aag	ggc	cga	ttc	acc	atc	tcc	aga	gac	aac	gcc	aag	aac	tca	ctg	tat	240
Lys	Gly	Arg	Phe	Thr	Ile	Ser	Arg	Asp	Asn	Ala	Lys	Asn	Ser	Leu	Tyr	
65					70				75					80		
ctg	caa	atg	aac	agc	ctg	aga	gcc	gag	gac	acg	gct	gtg	tat	tac	tgt	288
Leu	Gln	Met	Asn	Ser	Leu	Arg	Ala	Glu	Asp	Thr	Ala	Val	Tyr	Tyr	Cys	
				85					90					95		
gcg	agg	gat	cgg	ttt	tac	tat	ggt	tcg	ggg	agt	tat	tat	tac	tac	tac	336
Ala	Arg	Asp	Arg	Phe	Tyr	Tyr	Gly	Ser	Gly	Ser	Tyr	Tyr	Tyr	Tyr	Tyr	
			100					105					110			
aac	ggt	atg	gac	gtc	tgg	ggc	caa	ggg	acc	acg	gtc	acc	gtc	tcc	tca	384
Asn	Gly	Met	Asp	Val	Trp	Gly	Gln	Gly	Thr	Thr	Val	Thr	Val	Ser	Ser	
		115					120					125				

&lt;210&gt; 32

&lt;211&gt; 128

<212> PRT

<213> Homo sapiens

<400> 32

Glu Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Gln Pro Gly Gly  
1 5 10 15

Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Asn Ile Phe  
20 25 30

Gly Met Ser Trp Val Arg Gln Ala Pro Gly Lys Gly Leu Glu Trp Val  
35 40 45

Ala Asn Ile Lys Gln Asp Gly Ser Glu Lys Tyr Tyr Val Asp Ser Val  
50 55 60

Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys Asn Ser Leu Tyr  
65 70 75 80

Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys  
85 90 95

Ala Arg Asp Arg Phe Tyr Tyr Gly Ser Gly Ser Tyr Tyr Tyr Tyr Tyr  
100 105 110

Asn Gly Met Asp Val Trp Gly Gln Gly Thr Thr Val Thr Val Ser Ser  
115 120 125

<210> 33

<211> 33

<212> DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (1)..(33)

<223> Sequence from human antibody generated in mouse.

<400> 33  
agg gcc agt cag agt gtt agc agc tac tta gcc  
Arg Ala Ser Gln Ser Val Ser Ser Tyr Leu Ala  
1 5 10

33

&lt;210&gt; 34

&lt;211&gt; 11

&lt;212&gt; PRT

&lt;213&gt; Homo sapiens

&lt;400&gt; 34

Arg Ala Ser Gln Ser Val Ser Ser Tyr Leu Ala  
1 5 10

&lt;210&gt; 35

&lt;211&gt; 21

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1) .. (21)

&lt;223&gt; Sequence from human antibody generated in mouse.

<400> 35  
gat gca tcc aac agg gcc act  
Asp Ala Ser Asn Arg Ala Thr  
1 5

21

&lt;210&gt; 36

&lt;211&gt; 7

&lt;212&gt; PRT

&lt;213&gt; Homo sapiens

<400> 36

Asp Ala Ser Asn Arg Ala Thr  
1 5

<210> 37

<211> 30

<212> DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (1)..(30)

<223> Sequence from human antibody generated in mouse.

<400> 37

cag cag cgt agc aac tgg cct cca ttc act  
Gln Gln Arg Ser Asn Trp Pro Pro Phe Thr  
1 5 10

30

<210> 38

<211> 10

<212> PRT

<213> Homo sapiens

<400> 38

Gln Gln Arg Ser Asn Trp Pro Pro Phe Thr  
1 5 10

<210> 39

<211> 324

<212> DNA

<213> Homo sapiens

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1)..(324)

<223> Sequence from human antibody generated in mouse.  
V-segment: L6 and J-segment: JK3

&lt;220&gt;

&lt;221&gt; CDR1

&lt;222&gt; (70)..(102)

&lt;223&gt;

&lt;220&gt;

&lt;221&gt; CDR2

&lt;222&gt; (148)..(168)

&lt;223&gt;

&lt;220&gt;

&lt;221&gt; CDR3

&lt;222&gt; (265)..(294)

&lt;223&gt;

&lt;400&gt; 39

gaa	att	gtg	ttg	aca	cag	tct	cca	gcc	acc	ctg	tct	ttg	tct	cca	ggg	48
Glu	Ile	Val	Leu	Thr	Gln	Ser	Pro	Ala	Thr	Leu	Ser	Leu	Ser	Pro	Gly	
1				5				10						15		

gaa	aga	gcc	acc	ctc	tcc	tgc	agg	gcc	agt	cag	agt	gtt	agc	agc	tac	96
Glu	Arg	Ala	Thr	Leu	Ser	Cys	Arg	Ala	Ser	Gln	Ser	Val	Ser	Ser	Tyr	
			20					25					30			

tta	gcc	tgg	tac	caa	cag	aaa	cct	ggc	cag	gct	ccc	agg	ctc	ctc	atc	144
Leu	Ala	Trp	Tyr	Gln	Gln	Lys	Pro	Gly	Gln	Ala	Pro	Arg	Leu	Leu	Ile	
		35					40					45				

tat	gat	gca	tcc	aac	agg	gcc	act	ggc	atc	cca	gcc	agg	ttc	agt	ggc	192
Tyr	Asp	Ala	Ser	Asn	Arg	Ala	Thr	Gly	Ile	Pro	Ala	Arg	Phe	Ser	Gly	
	50					55					60					

agt ggg tct ggg aca gac ttc act ctc acc atc agc agc cta gag cct 240  
 Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser Leu Glu Pro  
 65 70 75 80

gaa gat ttt gca gtt tat tac tgt cag cag cgt agc aac tgg cct cca 288  
 Glu Asp Phe Ala Val Tyr Tyr Cys Gln Gln Arg Ser Asn Trp Pro Pro  
 85 90 95

ttc act ttc ggc cct ggg acc aaa gtg gat atc aaa 324  
 Phe Thr Phe Gly Pro Gly Thr Lys Val Asp Ile Lys  
 100 105

<210> 40

<211> 108

<212> PRT

<213> Homo sapiens

<400> 40

Glu Ile Val Leu Thr Gln Ser Pro Ala Thr Leu Ser Leu Ser Pro Gly  
 1 5 10 15

Glu Arg Ala Thr Leu Ser Cys Arg Ala Ser Gln Ser Val Ser Ser Tyr  
 20 25 30

Leu Ala Trp Tyr Gln Gln Lys Pro Gly Gln Ala Pro Arg Leu Leu Ile  
 35 40 45

Tyr Asp Ala Ser Asn Arg Ala Thr Gly Ile Pro Ala Arg Phe Ser Gly  
 50 55 60

Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser Leu Glu Pro  
 65 70 75 80

Glu Asp Phe Ala Val Tyr Tyr Cys Gln Gln Arg Ser Asn Trp Pro Pro  
 85 90 95

Phe Thr Phe Gly Pro Gly Thr Lys Val Asp Ile Lys  
 100 105

<210> 41

<211> 15

<212> DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (1)..(15)

<223> Sequence from human antibody generated in mouse.

<400> 41

agc ttt tgg atg agc

Ser Phe Trp Met Ser

1 5

15

<210> 42

<211> 5

<212> PRT

<213> Homo sapiens

<400> 42

Ser Phe Trp Met Ser

1 5

<210> 43

<211> 30

<212> DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (1)..(30)

<223> Sequence from human antibody generated in mouse.

<400> 43



aac ata aag caa gat gga agt gag aaa ttc  
 Asn Ile Lys Gln Asp Gly Ser Glu Lys Phe  
 1 5 10

30

&lt;210&gt; 44

&lt;211&gt; 10

&lt;212&gt; PRT

&lt;213&gt; Homo sapiens

&lt;400&gt; 44

Asn Ile Lys Gln Asp Gly Ser Glu Lys Phe  
 1 5 10

&lt;210&gt; 45

&lt;211&gt; 54

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1)..(54)

&lt;223&gt; Sequence from human antibody generated in mouse.

&lt;400&gt; 45

gat cgt att aca atg gtt cgg ccc tat tac tac ttc tac aac ggt ctg  
 Asp Arg Ile Thr Met Val Arg Pro Tyr Tyr Tyr Phe Tyr Asn Gly Leu  
 1 5 10 15

48

gac gtc  
 Asp Val

54

&lt;210&gt; 46

&lt;211&gt; 18

&lt;212&gt; PRT

&lt;213&gt; Homo sapiens

<400> 46

Asp Arg Ile Thr Met Val Arg Pro Tyr Tyr Tyr Phe Tyr Asn Gly Leu  
1                      5                      10                      15

Asp Val

<210> 47

<211> 381

<212> DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (1) .. (381)

<223> Sequence from human antibody generated in mouse.  
V-segment: 3-7, D-segment: 3-10 and J-segment: JH6b

<220>

<221> CDR1

<222> (91) .. (102)

<223>

<220>

<221> CDR2

<222> (148) .. (177)

<223>

<220>

<221> CDR3

<222> (295) .. (348)

&lt;223&gt;

&lt;400&gt; 47

gag gta cag ctg gtg gag tct ggg gga ggc ttg gtc cag ccg ggg ggg	48
Glu Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Gln Pro Gly Gly	
1 5 10 15	
tcc ctg aga ctc tcc tgt gca gct tct gga ttc acc ttt agt agc ttt	96
Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Ser Phe	
20 25 30	
tgg atg agc tgg gtc cgc cag gct cca ggg aag ggg ctg gag tgg gtg	144
Trp Met Ser Trp Val Arg Gln Ala Pro Gly Lys Gly Leu Glu Trp Val	
35 40 45	
gcc aac ata aag caa gat gga agt gag aaa ttc tat gtg gac tct gtg	192
Ala Asn Ile Lys Gln Asp Gly Ser Glu Lys Phe Tyr Val Asp Ser Val	
50 55 60	
aag ggc cga ttc acc atc tcc aga gac aac gcc aag aac tca ctg tat	240
Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys Asn Ser Leu Tyr	
65 70 75 80	
ctg caa atg aac agc ctg aga gcc gag gac acg gct gtg tat tac tgt	288
Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys	
85 90 95	
gcg agg gat cgt att aca atg gtt cgg ccc tat tac tac ttc tac aac	336
Ala Arg Asp Arg Ile Thr Met Val Arg Pro Tyr Tyr Tyr Phe Tyr Asn	
100 105 110	
ggg ctg gac gtc tgg ggc caa ggg acc acg gtc acc gtc tcc tca	381
Gly Leu Asp Val Trp Gly Gln Gly Thr Thr Val Thr Val Ser Ser	
115 120 125	

&lt;210&gt; 48

&lt;211&gt; 127

&lt;212&gt; PRT

&lt;213&gt; Homo sapiens

&lt;400&gt; 48

Glu Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Gln Pro Gly Gly	
1 5 10 15	
Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Ser Phe	
20 25 30	
Trp Met Ser Trp Val Arg Gln Ala Pro Gly Lys Gly Leu Glu Trp Val	

35	40	45
Ala Asn Ile Lys Gln Asp Gly Ser Glu Lys Phe Tyr Val Asp Ser Val		
50	55	60
Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys Asn Ser Leu Tyr		
65	70	75
Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys		
	85	90
Ala Arg Asp Arg Ile Thr Met Val Arg Pro Tyr Tyr Tyr Phe Tyr Asn		
	100	105
Gly Leu Asp Val Trp Gly Gln Gly Thr Thr Val Thr Val Ser Ser		
115	120	125

&lt;210&gt; 49

&lt;211&gt; 930

&lt;212&gt; DNA

&lt;213&gt; Streptococcus pneumoniae

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1)..(930)

&lt;223&gt; Sequence of Streptococcus pneumoniae surface adhesin A (PsaA)- A Variant

&lt;400&gt; 49

atg aaa aaa tta ggt aca tta ctc gtt ctc ttt ctt tct gca atc att	48
Met Lys Lys Leu Gly Thr Leu Leu Val Leu Phe Leu Ser Ala Ile Ile	
1	5
	10
	15

ctt gta gca tgt gct agc gga aaa aaa gat aca act tct ggt caa aaa	96
Leu Val Ala Cys Ala Ser Gly Lys Lys Asp Thr Thr Ser Gly Gln Lys	
	20
	25
	30

cta aaa gtt gtt gct aca aac tca atc atc gct gat att act aaa aat	144
Leu Lys Val Val Ala Thr Asn Ser Ile Ile Ala Asp Ile Thr Lys Asn	
	35
	40
	45

att gct ggt gac aaa att gac ctt cat agt atc gtt ccg att ggg caa	192
Ile Ala Gly Asp Lys Ile Asp Leu His Ser Ile Val Pro Ile Gly Gln	

50	55	60	
gac cca cac gaa tac gaa cca ctt cct gaa gac gtt aag aaa act tct Asp Pro His Glu Tyr Glu Pro Leu Pro Glu Asp Val Lys Lys Thr Ser 65 70 75 80			240
gag gct gat ttg att ttc tat aac ggt atc aac ctt gaa aca ggt ggc Glu Ala Asp Leu Ile Phe Tyr Asn Gly Ile Asn Leu Glu Thr Gly Gly 85 90 95			288
aat gct tgg ttt aca aaa ttg gta gaa aat gcc aag aaa act gaa aac Asn Ala Trp Phe Thr Lys Leu Val Glu Asn Ala Lys Lys Thr Glu Asn 100 105 110			336
aaa gac tac ttc gca gtc agc gac ggc gtt gat gtt atc tac ctt gaa Lys Asp Tyr Phe Ala Val Ser Asp Gly Val Asp Val Ile Tyr Leu Glu 115 120 125			384
ggt caa aat gaa aaa gga aaa gaa gac cca cac gct tgg ctt aac ctt Gly Gln Asn Glu Lys Gly Lys Glu Asp Pro His Ala Trp Leu Asn Leu 130 135 140			432
gaa aac ggt att att ttt gct aaa aat atc gcc aaa caa ttg agc gcc Glu Asn Gly Ile Ile Phe Ala Lys Asn Ile Ala Lys Gln Leu Ser Ala 145 150 155 160			480
aaa gac cct aac aat aaa gaa ttc tat gaa aaa aat ctc aaa gaa tat Lys Asp Pro Asn Asn Lys Glu Phe Tyr Glu Lys Asn Leu Lys Glu Tyr 165 170 175			528
act gat aag tta gac aaa ctt gat aaa gaa agt aag gat aaa ttt aat Thr Asp Lys Leu Asp Lys Leu Asp Lys Glu Ser Lys Asp Lys Phe Asn 180 185 190			576
aag atc cct gct gaa aag aaa ctc att gta acc agc gaa gga gca ttc Lys Ile Pro Ala Glu Lys Lys Leu Ile Val Thr Ser Glu Gly Ala Phe 195 200 205			624
aaa tac ttc tct aaa gcc tat ggt gtt cca agt gcc tac atc tgg gaa Lys Tyr Phe Ser Lys Ala Tyr Gly Val Pro Ser Ala Tyr Ile Trp Glu 210 215 220			672
atc aat act gaa gaa gaa gga act cct gaa caa atc aag acc ttg gtt Ile Asn Thr Glu Glu Glu Gly Thr Pro Glu Gln Ile Lys Thr Leu Val 225 230 235 240			720
gaa aaa ctt cgc caa aca aaa gtt cca tca ctc ttt gta gaa tca agt Glu Lys Leu Arg Gln Thr Lys Val Pro Ser Leu Phe Val Glu Ser Ser 245 250 255			768
gtg gat gac cgt cca atg aaa act gtt tct caa gac aca aac atc cca Val Asp Asp Arg Pro Met Lys Thr Val Ser Gln Asp Thr Asn Ile Pro 260 265 270			816
atc tac gca caa atc ttt act gac tct atc gca gaa caa ggt aaa gaa Ile Tyr Ala Gln Ile Phe Thr Asp Ser Ile Ala Glu Gln Gly Lys Glu 275 280 285			864
ggc gac agc tac tac agc atg atg aaa tac aac ctt gac aag att gct			912

Gly Asp Ser Tyr Tyr Ser Met Met Lys Tyr Asn Leu Asp Lys Ile Ala  
 290 295 300

gaa gga ttg gca aaa taa  
 Glu Gly Leu Ala Lys  
 305

930

&lt;210&gt; 50

&lt;211&gt; 309

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 50

Met Lys Lys Leu Gly Thr Leu Leu Val Leu Phe Leu Ser Ala Ile Ile  
 1 5 10 15

Leu Val Ala Cys Ala Ser Gly Lys Lys Asp Thr Thr Ser Gly Gln Lys  
 20 25 30

Leu Lys Val Val Ala Thr Asn Ser Ile Ile Ala Asp Ile Thr Lys Asn  
 35 40 45

Ile Ala Gly Asp Lys Ile Asp Leu His Ser Ile Val Pro Ile Gly Gln  
 50 55 60

Asp Pro His Glu Tyr Glu Pro Leu Pro Glu Asp Val Lys Lys Thr Ser  
 65 70 75 80

Glu Ala Asp Leu Ile Phe Tyr Asn Gly Ile Asn Leu Glu Thr Gly Gly  
 85 90 95

Asn Ala Trp Phe Thr Lys Leu Val Glu Asn Ala Lys Lys Thr Glu Asn  
 100 105 110

Lys Asp Tyr Phe Ala Val Ser Asp Gly Val Asp Val Ile Tyr Leu Glu  
 115 120 125

Gly Gln Asn Glu Lys Gly Lys Glu Asp Pro His Ala Trp Leu Asn Leu  
 130 135 140

Glu Asn Gly Ile Ile Phe Ala Lys Asn Ile Ala Lys Gln Leu Ser Ala  
 145 150 155 160

Lys Asp Pro Asn Asn Lys Glu Phe Tyr Glu Lys Asn Leu Lys Glu Tyr  
 165 170 175

Thr Asp Lys Leu Asp Lys Leu Asp Lys Glu Ser Lys Asp Lys Phe Asn  
 180 185 190

Lys Ile Pro Ala Glu Lys Lys Leu Ile Val Thr Ser Glu Gly Ala Phe  
 195 200 205

Lys Tyr Phe Ser Lys Ala Tyr Gly Val Pro Ser Ala Tyr Ile Trp Glu  
 210 215 220

Ile Asn Thr Glu Glu Glu Gly Thr Pro Glu Gln Ile Lys Thr Leu Val  
 225 230 235 240

Glu Lys Leu Arg Gln Thr Lys Val Pro Ser Leu Phe Val Glu Ser Ser  
 245 250 255

Val Asp Asp Arg Pro Met Lys Thr Val Ser Gln Asp Thr Asn Ile Pro  
 260 265 270

Ile Tyr Ala Gln Ile Phe Thr Asp Ser Ile Ala Glu Gln Gly Lys Glu  
 275 280 285

Gly Asp Ser Tyr Tyr Ser Met Met Lys Tyr Asn Leu Asp Lys Ile Ala  
 290 295 300

Glu Gly Leu Ala Lys  
 305

<210> 51

<211> 25

<212> PRT

<213> Streptococcus pneumoniae

<400> 51

Met Lys Lys Leu Gly Thr Leu Leu Val Leu Phe Leu Ser Ala Ile Ile  
 1 5 10 15

Leu Val Ala Cys Ala Ser Gly Lys Lys  
 20 25

<210> 52

<211> 25

<212> PRT

<213> Streptococcus pneumoniae

<400> 52

Ala Ser Gly Lys Lys Asp Thr Thr Ser Gly Gln Lys Leu Lys Val Val  
1 5 10 15

Ala Thr Asn Ser Ile Ile Ala Asp Ile  
20 25

<210> 53

<211> 25

<212> PRT

<213> Streptococcus pneumoniae

<400> 53

Ile Ile Ala Asp Ile Thr Lys Asn Ile Ala Gly Asp Lys Ile Asp Leu  
1 5 10 15

His Ser Ile Val Pro Ile Gly Gln Asp  
20 25

<210> 54

<211> 65

<212> PRT

<213> Streptococcus pneumoniae

<400> 54

Met Lys Lys Leu Gly Thr Leu Leu Val Leu Phe Leu Ser Ala Ile Ile  
1 5 10 15

Leu Val Ala Cys Ala Ser Gly Lys Lys Asp Thr Thr Ser Gly Gln Lys



20

25

30

Leu Lys Val Val Ala Thr Asn Ser Ile Ile Ala Asp Ile Thr Lys Asn  
 35 40 45

Ile Ala Gly Asp Lys Ile Asp Leu His Ser Ile Val Pro Ile Gly Gln  
 50 55 60

Asp  
 65

<210> 55

<211> 960

<212> DNA

<213> Streptococcus pneumoniae

<220>

<221> CDS

<222> (1)..(930)

<223> Sequence of Streptococcus pneumoniae surface adhesin A (PsaA)

<400> 55

atg aaa aaa tta ggt aca tta ctc gtt ctc ttt ctt tct gca atc att 48  
 Met Lys Lys Leu Gly Thr Leu Leu Val Leu Phe Leu Ser Ala Ile Ile  
 1 5 10 15

ctt gta gca tgt gct agc gga aaa aaa gat aca act tct ggt caa aaa 96  
 Leu Val Ala Cys Ala Ser Gly Lys Lys Asp Thr Thr Ser Gly Gln Lys  
 20 25 30

cta aaa gtt gtt gct aca aac tca atc atc gct gat att act aaa aat 144  
 Leu Lys Val Val Ala Thr Asn Ser Ile Ile Ala Asp Ile Thr Lys Asn  
 35 40 45

att gct ggt gac aaa att gac ctt cat agt atc gtt ccg att ggg caa 192  
 Ile Ala Gly Asp Lys Ile Asp Leu His Ser Ile Val Pro Ile Gly Gln  
 50 55 60

gac cca cac gaa tac gaa cca ctt cct gaa gac gtt aag aaa act tct 240  
 Asp Pro His Glu Tyr Glu Pro Leu Pro Glu Asp Val Lys Lys Thr Ser  
 65 70 75 80

gag gct gat ttg att ttc tat aac ggt atc aac ctt gaa aca ggt ggc 288  
 Glu Ala Asp Leu Ile Phe Tyr Asn Gly Ile Asn Leu Glu Thr Gly Gly  
 85 90 95

aat gct tgg ttt aca aaa tta gta gaa aat gcc aag aaa act gaa aac Asn Ala Trp Phe Thr Lys Leu Val Glu Asn Ala Lys Lys Thr Glu Asn 100 105 110	336
aaa gac tac ttc gca gtc agc gac ggc gtt gat gtt atc tac ctt gaa Lys Asp Tyr Phe Ala Val Ser Asp Gly Val Asp Val Ile Tyr Leu Glu 115 120 125	384
ggt caa aat gaa aaa gga aaa gaa gac cca cac gct tgg ctt aac ctt Gly Gln Asn Glu Lys Gly Lys Glu Asp Pro His Ala Trp Leu Asn Leu 130 135 140	432
gaa aac ggt att att ttt gct aaa aat atc gcc aaa caa ttg agc gcc Glu Asn Gly Ile Ile Phe Ala Lys Asn Ile Ala Lys Gln Leu Ser Ala 145 150 155 160	480
aaa gac cct aac aat aaa gaa ttc tat gaa aaa aat ctc aaa gaa tat Lys Asp Pro Asn Asn Lys Glu Phe Tyr Glu Lys Asn Leu Lys Glu Tyr 165 170 175	528
act gat aag tta gac aaa ctt gat aaa gaa agt aag gat aaa ttt aat Thr Asp Lys Leu Asp Lys Leu Asp Lys Glu Ser Lys Asp Lys Phe Asn 180 185 190	576
aag atc cct gct gaa aag aaa ctc att gta acc agc gaa gga gca ttc Lys Ile Pro Ala Glu Lys Lys Leu Ile Val Thr Ser Glu Gly Ala Phe 195 200 205	624
aaa tac ttc tct aaa gcc tat ggt gtt cca agt gcc tac atc tgg gaa Lys Tyr Phe Ser Lys Ala Tyr Gly Val Pro Ser Ala Tyr Ile Trp Glu 210 215 220	672
atc aat act gaa gaa gaa gga act cct gaa caa atc aag acc ttg gtt Ile Asn Thr Glu Glu Glu Gly Thr Pro Glu Gln Ile Lys Thr Leu Val 225 230 235 240	720
gaa aaa ctt cgc caa aca aaa gtt cca tca ctc ttt gta gaa tca agt Glu Lys Leu Arg Gln Thr Lys Val Pro Ser Leu Phe Val Glu Ser Ser 245 250 255	768
gtg gat gac cgt cca atg aaa act gtt tct caa gac aca aac atc cca Val Asp Asp Arg Pro Met Lys Thr Val Ser Gln Asp Thr Asn Ile Pro 260 265 270	816
atc tac gca caa atc ttt act gac tct atc gca gaa caa ggt aaa gaa Ile Tyr Ala Gln Ile Phe Thr Asp Ser Ile Ala Glu Gln Gly Lys Glu 275 280 285	864
ggc gac agc tac tac agc atg atg aaa tac aac ctt gac aag att gct Gly Asp Ser Tyr Tyr Ser Met Met Lys Tyr Asn Leu Asp Lys Ile Ala 290 295 300	912
gga gga ttg gca aaa taa gacaagattg ctgaaggatt ggcaaaataa Gly Gly Leu Ala Lys 305	960

&lt;210&gt; 56

&lt;211&gt; 309

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 56

Met Lys Lys Leu Gly Thr Leu Leu Val Leu Phe Leu Ser Ala Ile Ile  
 1 5 10 15

Leu Val Ala Cys Ala Ser Gly Lys Lys Asp Thr Thr Ser Gly Gln Lys  
 20 25 30

Leu Lys Val Val Ala Thr Asn Ser Ile Ile Ala Asp Ile Thr Lys Asn  
 35 40 45

Ile Ala Gly Asp Lys Ile Asp Leu His Ser Ile Val Pro Ile Gly Gln  
 50 55 60

Asp Pro His Glu Tyr Glu Pro Leu Pro Glu Asp Val Lys Lys Thr Ser  
 65 70 75 80

Glu Ala Asp Leu Ile Phe Tyr Asn Gly Ile Asn Leu Glu Thr Gly Gly  
 85 90 95

Asn Ala Trp Phe Thr Lys Leu Val Glu Asn Ala Lys Lys Thr Glu Asn  
 100 105 110

Lys Asp Tyr Phe Ala Val Ser Asp Gly Val Asp Val Ile Tyr Leu Glu  
 115 120 125

Gly Gln Asn Glu Lys Gly Lys Glu Asp Pro His Ala Trp Leu Asn Leu  
 130 135 140

Glu Asn Gly Ile Ile Phe Ala Lys Asn Ile Ala Lys Gln Leu Ser Ala  
 145 150 155 160

Lys Asp Pro Asn Asn Lys Glu Phe Tyr Glu Lys Asn Leu Lys Glu Tyr  
 165 170 175

Thr Asp Lys Leu Asp Lys Leu Asp Lys Glu Ser Lys Asp Lys Phe Asn  
 180 185 190

Lys Ile Pro Ala Glu Lys Lys Leu Ile Val Thr Ser Glu Gly Ala Phe  
195 200 205

Lys Tyr Phe Ser Lys Ala Tyr Gly Val Pro Ser Ala Tyr Ile Trp Glu  
210 215 220

Ile Asn Thr Glu Glu Glu Gly Thr Pro Glu Gln Ile Lys Thr Leu Val  
225 230 235 240

Glu Lys Leu Arg Gln Thr Lys Val Pro Ser Leu Phe Val Glu Ser Ser  
245 250 255

Val Asp Asp Arg Pro Met Lys Thr Val Ser Gln Asp Thr Asn Ile Pro  
260 265 270

Ile Tyr Ala Gln Ile Phe Thr Asp Ser Ile Ala Glu Gln Gly Lys Glu  
275 280 285

Gly Asp Ser Tyr Tyr Ser Met Met Lys Tyr Asn Leu Asp Lys Ile Ala  
290 295 300

Gly Gly Leu Ala Lys  
305